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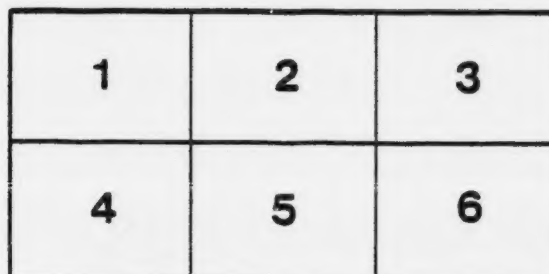
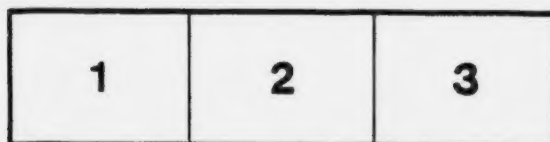
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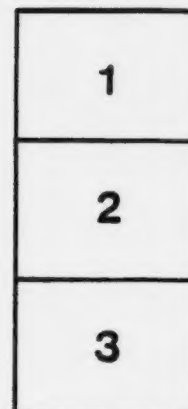
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Recent Auroral Displays.

By Prof. C. H. McLEOD, of McGill College.

The auroral display of the night of February 13th was observed throughout the northern portion of North America, in Britain, and probably throughout northern Europe. It was without doubt the most brilliant of the auroras observed here since 1870. In Montreal, it became visible shortly after sunset, and increasing in splendor attained its greatest brilliancy at between 7 and 7.30 p.m. Thereafter, gradually fading, it appeared as a uniform haze at 8.30, and the sky became completely overcast shortly after 9 o'clock. The most marked feature of this aurora was the bright red cone of light having its base between N. and N. 60° W., and extending to the zenith. The cone maintained an approximately constant position, and was of a uniform bright red colour, changing in tint only as it increased to a maximum and faded away. In front of this bright red screen there were slowly moving streamers of brilliant reds and greenish tints, and these also extended at times throughout the whole northern quarter of the sky. Low down in the north there was an arch of white light, and at one or two points in the N. E. there were columnar patches of coloured aurora which also maintained a fairly

constant position. The movements were of the slow and stately order rather than those of the "merry dancers."

Since this aurora there have been several minor ones, and on March 6th there was a display, which, though only faintly coloured, was quite as beautiful as that of the 13th. It was marked by a beautifully folded curtain like aurora standing above a very dark cloud. The changes in the curtain were very rapid, and at times showed light tints of pink and green. The streamers were numerous, but were not coloured, so far as observed.

It is perhaps worthy of remark in connection with these two auroras that the days on which they occur are included in a list of six days on which bright auroras are supposed to return periodically. The days are Feb. 3, Feb. 4, Feb. 13, March 6, Sept. 9, and Sept. 29. The aurora of March 12th, though not equal to those described, is also worthy of record. Like that of Feb. 13th it faded into a uniformly hazy sky.

The aurora of Feb. 13th marked one of the most violent magnetic storms on record. At the Kew observatory the "magnetometers were not able to record the complete extent of the vibrations to which free needles were subjected, nor could the entire change of force be secured in the field of the instrument. The limits, however, clearly recorded, were 2° of declination, from .1760 to .1830 of horizontal force, and from .4350 to .4420 units of vertical force expressed in C. G. S. measure in absolute force."† At Toronto, "during the early morning hours the declination magnet was considerably west of its mean position, and east of it during the afternoon. The vibrations were exceedingly rapid, notably so in the morning when the range of declination was over $2^{\circ} 37'$ The horizontal component was very much affected. Some of the vibrations were so rapid that they were barely recorded. The disturbance started with a sharp increase of the force. In the morning the force was considerably

† Letter to *Nature* by Mr. G. M. Whipple, Feb. 18th, 1892.

“below its mean value, and during the afternoon a rapid
“recovery commenced between 0h. 38' p.m. and 4 p.m.
“(Eastern time), an increase of .0096 C. G. S. took place;
“the total change of horizontal force during the disturb-
“ance was over .0148 C. G. S. Between 6 and 9 p.m. the
“vibrations were very swift. The changes in the vertical
“component were also considerable.”*

This magnetic storm was preceded by a most unusual outbreak of sun spots. The group of spots which became visible by rotation on Feb. 5th was, on the morning of the 8th, and for some days thereafter, easily visible to the naked eye. The area of the group, as measured here on the 8th, amounted in area to about $\frac{1}{120}$ th of the sun's visible hemisphere, the length of the disturbed area being about 140,000 and the breadth about 100,000 miles. On Feb. 13th there was also another very large group of spots, then about making good its position on the eastern limit, which added very materially to the total spotted area on this day. This latter is probably the same group of spots which, after making one rotation, is now (March 14th) nearly central on the sun.

* From a statement kindly furnished by Mr. C. Carpmæl.